PROBLEMS FOR SOLUTION.

ALGEBRA.

295. Proposed by CHARLES GILPIN, JR., Philadelphia, Pa.

In the equation $x^3 - ax \pm b = 0$, we have the following relation between the coefficients and the roots: (1) When $a^3/b^2 = 6.75$ there are three real roots, two of which are equal; (2) when $a^3/b^2 < 6.75$ there are two imaginary roots and one real one; and (3) when $a^3/b^2 > 6.75$ there are three real, unequal roots.

296. Proposed by G. B. M. ZERR, A. M., Ph. D., 4243 Girard Avenue, Philahelphia, Pa.

Sum the series, $1 + \frac{1}{6} + \frac{1}{20} + \frac{1}{50} + \frac{1}{105} + \frac{1}{196} + \frac{1}{330} + \ldots$

GEOMETRY.

329. Proposed by JOHN JAMES QUINN, Ph. D., Scottdale, Pa.

1. Determine the equation of the locus of a fixed point in a circle of radius r, rolling along the axis of an upright cylinder of the same radius, while the axis revolves (carrying the circle with it) through an angle equal to the central angle of the rolling circle formed by the radii to the fixed point and the point of contact.

2. Suppose the point projected into the surface of the cylinder.

3. What is the surface generated by the radius of the rolling circle?

4. What is the surface generated by a radius of the cylinder through the moving point?

CALCULUS.

252. Proposed by J. H. MEYER, S. J., Augusta, Ga.

Supposing the arc of a semi-circle to be stretched out into a straight line, and an indefinite number of perpendiculars erected on it, each equal to the versed sine of the corresponding arc; what would be the length of the curve traced out by the tops of the perpendiculars?

253. Proposed by R. D. CARMICHAEL, Anniston, Ala.

Find the maximum number of real points of inflection in each of the quartic curves $y^2 = \alpha x^4 \pm x^2 + \beta$, and find the necessary and sufficient relations between α and β for the existence of this number of points of inflection.

MECHANICS.

212. Proposed by W. J. GREENSTREET, M. A., Marling School, Stroud, Eng.

A peg A is vertically d feet above a peg B. A string AD, a feet long, with two equal, jointed rods DC, CB form the whole figure. Discuss the position of equilibrium.